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UNITED STATES DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

NATIONAL COOPERATIVE SOIL SURVEY TECHNICAL WORK-PLANNING CONFERENCE  
March 28 to April 2, 1955

REPORT OF COMMITTEE ON CRITERIA AND TECHNIQUES FOR MAPPING  
EXTENSIVE GRASSLAND AND FOREST LAND AREAS

This report deals with the planning and conduct of soil surveys intended to guide the use of soils for range and forestry, including arable, potentially arable, and nonarable soils. Grassland and forest land as considered by this committee comprise extensive areas, mostly nonarable, much of it mountainous, or too dry and without water supply for cultivated crops.

The broad objective of such soil surveys is, of course, to serve as an important aid in making decisions regarding use and management. This involves a number of fundamental considerations, some of an immediate nature and some of a long-time nature. Three of the principal uses of these kinds of land are for wood and forage production and for water supply. Other uses, such as for recreation and wildlife management are also involved, and in places, roads must be constructed and maintained for full usefulness of the land.

In some areas one use or kind of practice may be outstanding, whereas in other areas multiple use or several alternative uses and practices must be considered. In addition, and just as in areas used for cultivated crops, it is fundamentally important for the survey to increase our knowledge about soils and their distribution and to provide a basis for organizing and extending use experience and experimental research results.

In the soil survey of these kinds of land, particular attention in mapping needs to be directed toward expressing differences in soils that are relevant to significant natural differences in vegetation and its growth and to the water regime. The correlation of procedures for mapping both soils and vegetation together results in a more accurate and meaningful survey. It is most desirable, if not essential, for the soil scientist and the plant scientist to work closely together. In all cases, mapping procedures and interpretive groupings should be developed jointly by the soil scientist and the plant scientist.

General kinds of mapping units. - On a national basis, or even on a broad regional basis, only general consideration can be given kinds of mapping units. Specific consideration can be given only at the survey area level. Ordinarily, three general kinds of mapping units are used:



1. Mapping units consisting predominantly of a phase of a single taxonomic unit at some level in the natural classification scheme.
2. Complexes of taxonomic units.
3. Associations or groupings of taxonomic units.

All three general kinds of mapping units may be required within a survey area. Phases are usually broader than for surveys in cultivated areas. In deciding the level of generalization for taxonomic units, the general kinds of mapping units, and in setting up individual mapping units, the following interrelated items should be considered:

1. Intensity of mapping. - Field mapping scale, publication scale, and intensity of investigation must all be considered. The setting of a minimum acreage on the basis of degree of contrast for any single delineation within a survey area has proved helpful in maintaining a uniform level of intensity among surveyors. Some areas too small to delineate need to be shown by special map symbol.
2. Practicability of mapping. - This is an important item in setting up mapping units and must be considered along with intensity of mapping. The usefulness of a mapping unit in relation to time and cost of mapping needs to be considered. On the other hand, map separations that are not significant should not be made simply because it is easy to do so.
3. Principal use or uses and level of management of the land. - In grassland areas where the principal use is for range, mapping units should be so set up that significant differences in range site are expressed. Likewise, in forest areas where forestry is by far the principal use, mapping units should be so set up that significant differences in forest site are expressed. In areas where both uses are important, both forest and range sites need to be considered.
4. Probable important changes in kinds or intensity of use and management. - This is a most important item for consideration in areas where changes in use and management are taking place or are likely to take place in the foreseeable future. Two soils may have the same site index for timber production but behave quite differently under different management or when cleared and converted to range or cultivated use.

5. Other considerations. - Several other use items should be considered in setting up mapping units. These differ in their relative importance from area to area. Two of the more important of these involve:
  - a. Hydrologic differences, particularly permeability, water-holding capacity, erosion hazard, and hydrologic character of underlying rock formations.
  - b. Soil-material differences important in engineering uses, including differences significant in road construction and maintenance and in earth structures.

Recommendations:

1. That this committee be dissolved and that two committees of the National Conference be established with the following titles:
  - a. Soil Surveys for Range Uses.
  - b. Soil Surveys for Forestry.
2. That these two committees have broad scope, including consideration of use and management interpretations of soils.
3. That the four regional conferences be informed by this conference of the desirability of establishing either one or two committees covering comparable subject matter within each of the regional conferences. It is understood that some of the regional conferences have already established such committees.
4. That this report be accepted by the conference as the final report of the presently constituted committee.

R. A. Gardner, Chairman	R. D. Headley
L. R. Wohletz, Alternate Chairman	Montague Howard
A. R. Aandahl	W. M. Johnson
A. J. Baur	O. C. Lewis
H. Bindschadler	W. H. Lyford
C. E. Deardorff	T. B. Plair
D. L. Fontenot	F. G. Renner
A. H. Hasty	John Retzer



Notes Taken During Preliminary (Unscheduled) Meeting of  
the Committee on:

CRITERIA AND TECHNIQUES FOR MAPPING IN EXTENSIVE GRASSLAND AND  
FOREST LAND AREAS

Members of the Committee attending the 1955 National Work-Planning Conference met together the evening of March 29 in a brief session preliminary to the regularly scheduled meeting of the Committee on March 30. The following were in attendance:

<u>Committee Members:</u>	<u>Others:</u>
R. A. Gardner, Chairman	Earl Bowser
A. R. Aandahl	H. C. Dean
R. D. Headley	R. W. Eikleberry
W. M. Johnson	T. B. Hutchings
F. G. Renner	B. J. Patton

Mr. Gardner stated that the primary purpose for this preliminary session was to review and acquaint all Committee members present with the work that had been done during the past year and particularly to review the reports that had been submitted to him by various Committee members not in attendance at the conference this year.

The reports submitted by Committee members Montague Howard and Clyde Deardorff were then read.

Mr. Fred Renner described briefly the highlights of the San Jose range conference. Purpose of the conference was to discuss and develop procedures for determining range site and condition. A tentative basic policy statement relative to making range site and condition surveys by the Soil Conservation Service was drafted. This statement is now being reviewed in the Washington office of the Soil Conservation Service and more than likely will be released in the near future. Representatives of the Soil Survey participated in the conference and assisted in drafting the policy statement. Mr. Renner went on to say that in his opinion effective mapping of range areas is a job calling for both range and soils specialists to work closely together. Neither the range specialist nor the soil scientist can do the job alone.

Mr. Johnson: It should be expected that some mistakes will be made in mapping and in describing range sites. This will be particularly true in the early stages. Techniques will improve as more experience is gained. I would like to emphasize Mr. Renner's statement that the range and soils people should work closely together in setting up mapping legends and in describing the mapping units.

The general question of mapping combinations of selected individual soil factors versus the mapping of natural segments of the landscape in which all factors are considered was discussed. All present were in agreement that all factors should be considered together and that mapping units should be identifiable in the national soil classification system.

Mr. Gardner next reviewed the statement he had prepared in draft form for presentation at the regularly scheduled meeting of the Committee to be held on March 30. A number of changes in wording and phraseology were made at the request of the group. Use of the term "wild lands" in referring to range lands was pointed out to be particularly objectionable to most ranchers.

All present expressed agreement with the basic philosophies set forth in the statement prepared by Mr. Gardner and agreed that it should be presented at the regular Committee meeting.

Meeting Adjourned.

Notes by: R. D. Headley

Notes Taken During the Regular Meeting of the Committee on:

CRITERIA AND TECHNIQUES FOR MAPPING IN EXTENSIVE GRASSLAND AND FOREST LAND AREAS.

Committee Chairman Gardner opened the meeting by introducing Mr. Fred Renner and Mr. Ted Blair of the Plant Technology Division in the Washington office of the Soil Conservation Service.

Work of the Committee during the past year was briefly reviewed. Reports from only two groups of states, the northeastern group and the western group, were received by the Chairman.

Mr. Arnold Baur was called upon to review the report submitted from the northeastern group of states. Mr. Baur read the report and discussed the recommendations. He stated that although individual soil characteristics were discussed in the report, it was the intention that all characteristics would be considered together and that mapping units would be identified in terms of the natural soil classification system. Dr. Kellogg, Mr. Blair, Mr. Renner, and others discussed the significance of the several categories of stoniness and rockiness described in the report. The general consensus was that the amount of stones and rocks on the surface should be recognized in soil classification but should not be directly interpreted in terms of effects on either the growth of trees or on harvesting possibilities.

Dr. Kellogg: Has any thought been given to differences in the nature of the surface soil such as might be brought about in areas that have been burned over frequently?

Mr. Baur: Not by the northeast subcommittee. It is my understanding that some studies of this are being conducted by others.

Dr. Kellogg: Such separations could be made by phase distinctions. Guidance will be needed from foresters if such separations are to be made.

A general discussion followed relative to the effects of varying amounts and depths of organic matter in surface horizons on re-seeding. It was agreed that insufficient scientific data are available at the present time to accurately appraise any significances in these regards.

There being no further discussion of the report submitted from the northeastern group of states, Mr. Gardner proceeded to read the report presented by Mr. Ray Chapin to the Western Regional Work-Planning Conference at Berkeley, California.

The chairman stated that no reports had been received either from the southeastern or the midwestern groups of states.

Mr. Frank Ritchie briefly outlined the system being used in Georgia to establish and interpret woodland site indexes.

Mr. Blair stated that similar work was being initiated throughout the southeast and that in another year much additional information should be available.

Dr. Kellogg: One assumption commonly made is that soils not suited for crops or grass are well suited for trees. Frequently, this is not true. As often as not, a number of these soils are not good for growing trees either. In many cases, soils in Classes I, II, and III are suited for and should be in trees. This suitability should be indicated. Soils should be grouped for crop suitability as well as for land capability.

A general discussion followed on the importance of determining the suitability of soils for a wide variety of uses including cultivated crops, grasses, and trees.

Mr. Renner was called upon next to summarize the results of the range conference held in San Jose, California, this winter.

Mr. Renner: The primary purpose of the conference was to develop procedures for determining range sites. Representatives of the Soil Survey staff participated in the conference and contributed materially to its success. Joint agreement was reached on what should constitute a range site. A basic policy statement was drafted relative to the making of range site surveys by the Soil Conservation Service. This statement is now being reviewed in the Washington office and is soon to be released. No attempt was made at the conference to spell out details on how range sites should be mapped in the field. This will be left for local determination.

Mr. Gardner: Work is underway to establish criteria for determining grass suitabilities (similar to the forest site indexes in the southeast) for range and forest soils in the west.

Mr. Renner: Do soils men ever consider mapping an interpretative unit such as a range site?

A general discussion of the problems involved in mapping interpretative groupings followed. Mr. Hockensmith emphasized the necessity of having at least a description of each kind of soil within a range site. This is needed especially in areas where lands suitable for cultivation are involved. General agreement was reached on this point. It was agreed also that the legend should point out areas which are suitable for cultivation.

Dr. Kellogg: Surveys of cultivated lands bordered by lands not suitable for cultivation should be extended far enough into the non-arable areas to definitely show that all lands suitable for cultivation have been included in the surveys. This would help avoid some of the misuses of soil survey maps that have been made in the past by unscrupulous people.

Dr. Aandahl: Would soils having differences significant from an engineering standpoint be separated in range site mapping?

Mr. Renner: I believe that in most cases these differences would also account for differences in vegetation which would result in different range sites.

Mr. Gardner next read the statement he had prepared for consideration as the report of the Committee to the conference as a whole. Several minor changes in phraseology were suggested by various committee members. These were incorporated in the report.

Chairman Gardner suggested that the work of the Committee at the national level might well be ended with this conference. He recommended that further consideration of the subject matter be handled at state and regional conference levels.

Mr. Johnson: The National Committee has rendered a number of important contributions and serves a useful function. I believe it should be continued in addition to having similar committees or subcommittees at the regional conferences.

Dr. Kellogg: I am convinced that the present committee is too large. I would favor establishment of two committees--one for range lands and one for forest lands. It would be very desirable to have similar committees at the regional level.

Mr. Johnson: I move that the joint committee at the national level be dissolved at this conference and be immediately reconstituted as two committees--one for range land and one for forest lands.

The motion was seconded and carried by unanimous vote.

Mr. Johnson: I move that the Committee go on record as strongly recommending that comparable committees be set up at the regional conference level and that these recommendations be sent to the chairman of each regional conference.

This motion was modified to the extent that it may be desirable for the two committees to meet as one joint committee in some regions whereas in other regions it may be that only one of the two committees would be needed.

The motion, as modified, was seconded and unanimously approved by voice vote.

Dr. Kellogg: It would be desirable for the Forest Service to be officially represented in these discussions. Perhaps we should strive to have the Forest Service designate representatives on the regional committees.

A general discussion followed relative to the desirability of including interpretation aspects within the provinces of the two new committees. It was agreed there would be no objection to this.

The following titles were suggested for the two new committees:

1. Committee on Soil Surveys for Range Uses.
2. Committee on Soil Surveys for Forestry Uses.

Mr. Johnson: I move that the report as written by Mr. Gardner and as revised by Committee action here today be submitted to the conference as the report of the Committee.

The motion was seconded and unanimously approved by voice vote.

Meeting Adjourned.

Notes by: R. D. Headley

UNITED STATES DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

NATIONAL COOPERATIVE SOIL SURVEY TECHNICAL WORK-PLANNING CONFERENCE  
St. Louis, Missouri  
March 28 - April 2, 1955

Notes on Conference Discussion of Report by Committee on:

CRITERIA AND TECHNIQUES FOR MAPPING IN EXTENSIVE GRASSLAND AND FOREST LAND AREAS.

The following notes cover only the very brief discussion from the floor following Mr. Gardner's presentation of the Committee's report. (Note: The discussion at this stage was brief due largely to the fact that most individuals attending the conference had already participated in one or both of the two meetings of the Committee. In view of this, the notes taken during the Committee discussions are attached as supplements).

Dr. Smith: The term "arable" as used in the report may be misleading to some. The term probably is intended to mean "suitable for cultivation." I am not sure it will be given that interpretation everywhere.

Mr. Gardner: Would anyone care to suggest a more suitable term as a substitute?

After a brief discussion it was generally agreed that the terms "arable" and "potentially arable" should continue to be used in referring to lands suitable for cultivation. The term "non-arable" will then refer to lands not suitable for cultivation even though the lands may be cultivated at the present time.

Dr. Kellogg: I agree with the recommendation that there should be separate committees for range lands and forest lands. The two kinds of lands are sometimes unrelated. With two committees the results of studies and research can be more easily analyzed and applied.

The Committee's report, including recommendations, as read by Chairman Gardner was accepted and approved by the conference. The Committee was dismissed.

Notes by: R. D. Headley

Committee Members:

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L. R. Wohletz, Alternate Chairman	Montague Howard	*T. B. Blair
*A. R. Aandahl	*W. M. Johnson	D. L. Fontenot
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\*Attended 1955 National Conference.

(See attachments)

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